



FORM PTO - 1449

INFORMATION DISCLOSURE STATEMENT

ATTORNEY DOCKET NO.: SNS-006CP1 (7268/10)

APPLICANTS: Shih et al.

SERIAL NO.: 09/347,637

FILING DATE: July 6 1999

GROUP: 2671

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U.S. PATENT DOCUMENTS

EXAM. INIT.		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
ECS	A1	2,475,484	07/05/49	DeNise	318	628	05/14/46
	A2	3,168,203	02/01/65	Gallistel	214	1	07/07/60
	A3	3,263,824	08/02/66	Jones et al.	214	1	12/20/63
	A4	3,449,008	06/10/69	Colechia	294	88	06/08/67
	A5	3,531,868	10/06/70	Stevenson	33	174	04/18/68
	A6	3,618,786	11/09/71	Fick	214	1CM	01/02/69
	A7	3,637,092	01/01/72	George et al.	214	1CM	04/30/70
	A8	3,920,972	11/18/75	Corwin et al.	235	151.1	07/16/74
	A9	3,944,798	03/16/76	Eaton	235	161.3	04/18/74
	A10	4,062,455	12/13/77	Flatau	214	1	11/01/76
	A11	4,150,803	04/24/79	Fernandez	244	135A	10/05/77
	A12	4,216,467	08/05/80	Colston	340	365L	12/22/77
	A13	4,302,138	11/24/81	Zarudiansky	414	5	01/22/79
	A14	4,367,532	01/04/83	Crum et al.	364	513	12/24/80
	A15	4,420,808	12/13/83	Diamond et al.	364	434	01/18/82
	A16	4,521,685	06/04/85	Rebman	250	229	03/01/82
	A17	4,604,016	08/05/86	Joyce	414	7	08/03/83
	A18	4,632,341	12/30/86	Repperger et al.	244	230	02/06/85
	A19	4,638,798	01/27/87	Shelden et al.	128	303B	09/10/80
	A20	4,653,011	03/24/87	Iwano	364	513	03/27/85
	A21	4,654,648	03/31/87	Herrington et al.	340	710	12/17/84
✓	A22	4,655,673	04/07/87	Hawkes	414	730	05/10/83
ECS	A23	4,661,032	04/28/87	Arai	414	5	12/18/85



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EC5	A24	4,670,851	06/02/87	Murakami et al.	364	518	10/22/84
	A25	4,676,002	06/30/87	Slocum	33	1 MP	12/20/85
	A26	4,680,519	07/14/87	Chand et al.	318	568	09/23/85
	A27	4,703,443	10/27/87	Moriyasu	364	559	02/07/85
	A28	4,729,098	03/01/88	Cline et al.	364	414	06/05/85
	A29	4,769,763	09/06/88	Trieb et al.	364	559	06/16/86
	A30	4,791,934	12/20/88	Brunnett	128	653	08/07/86
	A31	4,795,296	01/03/89	Jau	414	5	10/17/86
	A32	4,800,721	01/31/89	Cemenska et al.	60	393	02/13/87
	A33	4,819,195	04/04/89	Bell et al.	364	571.1	01/20/87
	A34	4,823,634	04/25/89	Culver	74	471	11/03/87
	A35	4,837,734	06/06/89	Ichikawa et al.	364	513	02/26/87
	A36	4,839,838	06/13/89	LaBiche et al.	364	709.1	03/30/87
	A37	4,853,874	08/01/89	Iwamoto et al.	364	513	11/20/87
	A38	4,888,538	12/19/89	Dimitrov et al.	318	675	01/13/88
	A39	4,893,981	01/16/90	Yoshinada et al.	414	5	03/26/87
	A40	4,907,970	03/13/90	Meenen, Jr.	434	45	03/30/88
	A41	4,907,973	03/13/90	Hon	434	262	11/14/88
	A42	4,942,538	07/17/90	Yuan et al.	364	513	02/23/89
	A43	4,945,305	07/31/90	Blood	324	207.2	04/11/89
	A44	4,945,501	07/31/90	Bell et al.	364	571.05	04/12/89
	A45	4,961,138	10/02/90	Gorniak	364	200	10/02/89
	A46	4,973,215	11/27/90	Karlen et al.	414	729	02/14/89
	A47	4,982,504	01/08/91	Söderberg et al.	33	502	02/17/89
	A48	4,988,981	01/29/91	Zimmerman et al.	340	709	02/28/89
EC5	A49	5,004,391	04/02/91	Burdea	414	6	08/21/89



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EC5	A76	5,255,211	10/19/93	Redmond	364	578	02/22/90
	A77	5,264,768	11/23/93	Gregory et al.	318	561	10/06/92
	A78	5,266,875	11/30/93	Slotine et al.	395	99x	05/01/91
	A79	5,354,162	10/11/94	Burdea et al.	414	5	10/11/94
	A80	5,382,885	01/17/95	Salcudean et al.	318	568.1	08/09/93
	A81	5,389,865	02/14/95	Jacobus et al.	318	568.1	12/02/92
	A82	5,396,265	03/07/95	Ulrich et al.	345	158	09/17/90
	A83	5,414,337	05/09/95	Schuler	318	561	06/11/93
	A84	5,429,140	07/04/95	Burdea et al.	128	774	06/04/93
	A85	5,438,529	08/01/95	Rosenberg et al.	364	709.1	01/26/94
	A86	5,459,382	10/17/95	Jacobus et al.	318	568.1	06/09/94
	A87	5,482,051	01/09/96	Reddy et al.	128	733	04/06/94
	A88	5,489,830	02/06/96	Fernandez	318	628	09/01/94
	A89	5,497,452	03/05/96	Shimizu et al.	395	120	03/02/92
	A90	5,515,078	05/07/96	Greschler et al.	345	156	
	A91	5,555,894	09/17/96	Doyama et al.	128	782	05/02/94
	A92	5,559,412	09/24/96	Schuler	318	561	05/03/95
	A93	5,576,727	11/19/96	Rosenberg et al.	345	179	06/05/95
	A94	5,587,937	12/24/96	Massie et al.	364	578	04/25/95
	A95	5,589,854	12/31/96	Tsai	345	161	06/22/95
	A96	5,623,582	04/22/97	Rosenberg	395	99	07/14/94
	A97	5,623,642	04/22/97	Katz et al.	395	500	04/06/94
	A98	5,625,576	04/29/97	Massie et al.	364	578	10/01/93
	A99	5,629,594	05/13/97	Jacobus et al.	318	568.1	10/16/95
↓	A100	5,642,469	06/24/97	Hannaford et al.	395	99	11/03/94
EC5	A101	5,666,138	09/09/97	Culver	345	161	11/22/94



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ECS	A50	5,007,300	04/16/91	Siva	74	471 X	01/22/90
	A51	5,018,922	05/28/91	Yoshinada et al.	414	5	09/12/89
	A52	5,019,761	05/28/91	Kraft	318	568.1	02/21/89
	A53	5,038,089	08/06/91	Szakaly	318	568.1	10/28/88
	A54	5,040,306	08/20/91	McMurtry et al.	33	556	02/20/89
	A55	5,044,956	09/03/91	Behensky et al.	434	45	01/12/89
	A56	5,053,975	10/01/91	Tsuchihashi et al.	364	513	06/08/89
	A57	5,072,361	12/10/91	Davis et al.	364	167	02/01/90
	A58	5,088,046	02/11/92	McMurtry	364	474	12/19/88
	A59	5,088,055	02/11/92	Oyama	364	560	02/22/90
	A60	5,103,404	04/07/92	McIntosh	318	568.2	12/20/89
	A61	5,105,367	04/14/92	Tsuchihashi et al.	395	99	10/16/89
	A62	5,116,051	05/26/92	Moncrief et al.	273	448 B	06/08/90
	A63	5,116,180	05/26/92	Fung et al.	414	5	05/03/90
	A64	5,130,632	07/14/92	Ezawa et al.	318	568.1	12/05/90
	A65	5,131,844	07/21/92	Marinaccio et al.	433	72	04/08/91
	A66	5,142,931	09/01/92	Menahem	74	471 XY	02/14/91
	A67	5,143,505	09/01/92	Burdea et al.	414	5	02/26/91
	A68	5,184,319	02/02/93	Kramer	364	806	02/02/90
	A69	5,185,561	02/09/93	Good et al.	318	432	07/23/91
	A70	5,189,806	03/02/93	McMurtry et al.	33	503	08/17/92
	A71	5,193,963	03/16/93	McAffee et al	414	5	10/01/90
	A72	5,204,824	04/20/93	Fujimaki	364	474	08/23/90
	A73	5,220,260	06/15/93	Schuler	318	561	10/24/91
	A74	5,223,776	06/29/93	Radke et al.	318	568.1	12/31/90
ECS	A75	5,239,246	08/24/93	Kim	318	568.1	07/08/92



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ECJ	A102	5,691,898	11/25/97	Rosenberg et al.	364	190	03/28/96
	A103	5,694,013	12/02/97	Stewart et al.	318	561	09/06/96
	A104	5,701,140	12/23/97	Rosenberg et al.	345	156	07/12/94
	A105	5,721,566	02/24/98	Rosenberg et al.	345	161	06/09/95
	A106	5,724,264	03/03/98	Rosenberg et al.	364	559	08/07/95
	A107	5,731,804	03/24/98	Rosenberg	345	156	01/18/95
	A108	5,734,373	03/31/98	Rosenberg et al.	345	161	12/01/95
	A109	5,737,505	04/07/98	Shaw et al.	395	119	10/15/96
	A110	5,739,811	04/14/98	Rosenberg et al.	345	161	09/27/95
	A111	5,742,278	04/21/98	Chen et al.	345	156	11/01/95
	A112	5,751,289	05/12/98	Myers	345	419	01/16/96
	A113	5,754,023	05/19/98	Roston et al.	318	561	10/22/96
	A114	5,767,839	06/16/98	Rosenberg	345	161	03/03/95
	A115	5,769,640	06/23/98	Jacobus et al.	434	262	08/10/95
	A116	5,784,542	07/21/98	Ohm et al.	395	95	10/23/96
	A117	5,790,108	08/04/98	Salcudean et al.	345	184	10/23/92
	A118	5,798,752	08/25/98	Buxton et al.	345	146	02/27/95
	A119	5,800,177	09/01/98	Gillio	434	262	07/11/96
	A120	5,800,178	09/01/98	Gillio	434	262	07/11/96
	A121	5,800,179	09/01/98	Bailey	434	262	07/23/96
	A122	5,802,353	09/01/98	Avila et al.	395	500	06/12/96
	A123	5,803,738	09/08/98	Latham	434	29	08/05/96
	A124	5,805,140	09/08/98	Rosenberg et al.	345	161	11/17/95
	A125	5,821,920	10/13/98	Rosenberg et al.	345	156	03/28/97
↓	A126	5,825,308	10/20/98	Rosenberg	341	20	11/26/96
ECJ	A127	5,828,197	10/27/98	Martin, et al.	318	567	10/25/96



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<i>ECs</i>	A128	5,831,408	11/03/98	Jacobus, et al.	318	568.1	05/12/97
	A129	5,844,392	12/01/98	Peurach et al.	318	568.2	05/21/97
	A130	5,859,934	01/12/99	Green	382	296	01/14/97
	A131	5,880,714	03/09/99	Rosenberg et al.	345	156	01/15/97
	A132	5,889,670	03/30/99	Schuler et al.	364	186	01/11/96
	A133	5,903,456	05/11/99	Schena et al.	364	190	01/27/97
	A134	5,907,487	05/25/99	Rosenberg et al.	364	190	04/02/97
	A135	5,913,727	06/22/99	Ahdoot	463	39	06/13/97
	A136	5,929,607	07/27/99	Rosenberg et al.	320	166	04/02/97
	A137	5,929,846	07/27/99	Rosenberg et al.	345	161	06/05/97
	A138	5,956,484	09/21/99	Rosenberg et al.	395	200.3	08/01/96
	A139	6,084,587	07/04/00	Tarr et al.	345	419	02/08/96
	A140	6,191,796 B1	02/20/01	Tarr	345	433	01/21/98
	A141	6,337,678 B1	01/20/02	Fish	345	156	07/21/99
<i>↓</i>	A142	6,342,880 B2	01/20/02	Rosenberg et al.	345	161	10/06/99
<i>ECs</i>	A143	D. 377,932	02/11/97	Schena et al.	D14	114	10/31/95

FOREIGN PATENT DOCUMENTS

EXAM INIT.		DOCUMENT NUMBER	DATE	COUNTRY CODE	CLASS	SUB CLASS	FILING DATE	ABSTRA CT ONLY	ENGLISH LANG (Y/N)
<i>BS</i>	B1	WO 95/02801	01/26/95	PCT	G01B	7/03	07/12/94	N	Y
	B2	WO 96/16397	05/30/96	PCT	G09G	5/08	11/22/95	N	Y
	B3	WO 96/22591	07/25/96	PCT	G09G	5/00	01/17/96	N	Y
	B4	WO 96/42078	12/27/96	PCT	G09G	3/02	06/07/96	N	Y
	B5	WO 97/06410	02/20/97	PCT	G01C	7/00	07/29/96	N	Y
<i>↓</i>	B6	WO 97/12337	04/03/97	PCT	G06F	19/00	09/25/96	N	Y
<i>BS</i>	B7	WO 97/12357	04/03/97	PCT	G09G	5/00	09/25/96	N	Y



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EY	B8	WO 97/19440	05/29/97	PCT	G09G	5/00	11/05/96	N	Y
	B9	WO 97/21160	06/12/97	PCT	G06F	N/A	11/26/96	N	Y
	B10	WO 97/44775	11/27/97	PCT	G09G G06G B25J G05B G06F G06G A03B	5/08 3/00 9/18 19/19 19/408 17/00 7/48 71/00 24/00	05/16/97	N	Y
	B11	WO 98/06024	02/12/98	PCT	G06F	3/00 15/16 17/30	07/31/97	N	Y
	B12	WO 98/26342	06/18/98	PCT	G06F	N/A	11/25/97	N	Y
	B13	WO 98/30951	07/16/98	PCT	G06F	3/02	01/07/98	N	Y
	B14	WO 98/58308	12/23/98	PCT	G06F	3/033	06/15/98	N	Y
	B15	WO 98/58323	12/23/98	PCT	G06F	15/00	06/16/98	N	Y
✓	B16	WO 99/10872	03/04/99	PCT	G09G	5/00	08/21/98	N	Y
ES	B17	EP 0 915 434 A2	05/12/99	EP	G06T	15/50	05/14/98	N	Y

OTHER ART, JOURNAL ARTICLES, ETC.

EXAM. INIT.	OTHER DOCUMENTS: (Including Author, Title, Date, Relevant Pages, Place of Publication)
ECF	C1 Adachi, "Touch and Trace on the Free-Form Surface of Virtual Object," Proceedings of IEEE Virtual Reality Annual International Symposium, September 18-22, 1993, Seattle WA, pgs. 162-168.
	C2 Agrawala et al., "3D Painting on Scanned Surfaces", Stanford University, 1995, pgs 145-150.
	C3 Atkinson et al., "Computing with Feeling" COMPUT. & GRAPHICS, Vol. 2, 1977, pgs. 97-103.
	C4 Avila et al., "A Haptic Interaction Method for Volume Visualization," GE Corporate Research & Development, Schenectady, NY, pp. 1-9 (1996).
	C6 Barr, "Global and Local Deformations of Solid Primitives"; COMPUTER GRAPHICS; Vol. 18, No. 3, pgs. 21-30 (July, 1984).
	C7 Bergamasco, "Design of Hand Force Feedback Systems for Glove-like Advanced Interfaces", IEEE, September 1992, pp. 286-293.
	C8 Blinn, "Simulation of Wrinkled Surfaces," COMPUTER GRAPHICS, Volume 12-3, August 1978, pages 286-292.
ES	C9 Brooks et al., "Project GROPE - Haptic Displays for Scientific Visualization," COMPUTER GRAPHICS, Vol. 24, No. 4, August 1990, pgs. 177-185.



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ECS	C10	Burdea, "Force And Touch Feedback For Virtual Reality," John Wiley and Sons, Inc., New York, New York, pp. 190-193 (1996).
	C11	Colgate et al., "Factors Affecting the Z-Width of a Haptic Display," published by IEEE Computer Society Press, Los Alamitos, California, in Proceedings: 1994 IEEE International Conference On Robotics and Automation, held May 8-13, 1994 in San Diego, California, Vol. 4, 1994, pgs. 3205-3210.
	C12	Colgate et al., "Implementation of Stiff Virtual Walls in Force Reflecting Interfaces," IEEE Virtual Reality Annual International Symposium (Seattle, WA), pp. 202-208 (September 18-22, 1993).
	C13	Colgate et al., "Issues in the Haptic Display of Tool Use," published by IEEE Computer Society Press, Los Alamitos, California, in Proceedings: 1995 IEEE/RSJ International Conference on Intelligent Robots and Systems - Human Robot Interaction and Cooperative Robots, held August 5-9, 1995 in Pittsburgh, Pennsylvania, 1995, pgs. 140-145.
	C14	Decaudin, "Geometric Deformation by Merging a 3D-Object with a Simple Shape," Graphics Interface '96 Proceedings (Toronto, Canada), 6 pgs. (May 21-24, 1996).
	C15	Dworkin et al., "A New Model for Efficient Dynamic," Fourth Eurographics Animation and Simulation Workshop Proceedings Eurographics Technical Report Series, ISSN 1017-4656, September 4-5, 1993, pp. 135-147.
	C16	Galyean, "Sculpting: An Interactive Volumetric Modeling Technique," Computer Graphics (SIGGRAPH '91 Las Vegas), Vol. 25, No. 4, pp. 267-274 (July 1991).
	C17	Hashimoto et al., "Dynamic Force Simulator for Force Feedback Human-Machine Interaction", IEEE, September 1993, pp. 209-215.
	C18	Hirata et al., "3-Dimensional Interface Device for Virtual Work Space," Proceedings of the 1992 IEEE, July 7-10, 1992, pp. 889-896.
	C19	Hirota et al., "Providing Force Feedback in Virtual Environments", IEEE, September 1995, pp. 22-30.
	C20	Hirota et al., "Development of Surface Display," Proceedings of the Virtual Reality Annual International Symposium (Seattle), pp. 256-262 (September 18-23, 1993).
	C21	Howe et al., "Task Performance with a Dextrous Teleoperated Hand System," Telemanipulator Technology, November 1992, Proceedings of SPIE, Vol. 1833, pages 1-9.
	C22	Immersion Corporation, "Impulse Engine 2000," http://www.immerse.com/WWWpages/IE2000pg.htm , 2 pages (1997).
	C23	Immersion Corporation, "Laparoscopic IMPULSE ENGINE: A New FORCE FEEDBACK Surgical Simulation Tool", Immersion Corporation, 1995. http://www.immerse.com/wwwpages/lapIEpg.htm
	C24	Immersion Corporation, "Medical Simulation," 1 page, (undated)
	C25	Immersion Corporation, "The IMPULSE ENGINE", 1 page, Immersion Corporation, 1996.
	C26	Immersion Corporation, "Virtual Laparoscopic Interface", Immersion Corporation, 1995, 1 pg.
	C27	Inoue et al., "Parallel Manipulator," Proceedings of 3rd Robotics Research: The Third International Symposium, Faugeras & Giralt, eds., MIT Press 1986.
	C28	Ishii et al., "A 3D Interface Device with Force Feedback: A Virtual Work Space for Pick-and-Place Tasks", IEEE, September 1993, pp. 331-335.
	C29	Iwata, "Pen-based Haptic Virtual Environment," Proceedings of IEEE Virtual Reality Annual International Symposium, (September 18-22, 1993, Seattle, WA), pp. 287-292.
ECS	C30	Iwata, "Artificial Reality with Force-feedback: Development of Desktop Virtual Space with Compact Master Manipulator," Computer Graphics (SIGGRAPH '90 Dallas), Vol. 24, No. 4, pp. 165-170 (August 1990).



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ECS	C31	Kelley et al. "MagicMouse: Tactile and Kinesthetic Feedback in the Human-Computer Interface Using an Electromagnetically Actuated Input/Output Device," Department of Electrical Engineering, University of British Columbia, Vancouver, BC, V6T 1Z4, Canada, October 19, 1993, pp. 1-27.
	C32	Kotoku et al., "A Force Display Algorithm for Virtual Environments," SICE, pp. 347-355, 1992.
	C33	Kraft Ocean Systems, "Grips Underwater Manipulator System".
	C34	Kraft Telerobotics, Inc., "GRIPS Force Feedback Manipulator System,"
	C35	Kraft Telerobotics, Inc., "GRIPS Master/Slave Manipulator System," 1988.
	C36	Lewis, "Electronic Pen With Its Own Eraser", Personal Computers, July, 1995, page. C8.
	C37	Marcus et al., "EXOS Research on Master Controllers for Robotic Devices," Fifth Annual Workshop on Space Operations Applications and Research (SOAR '91) pp. 238-245, July 1991.
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